FIG. 1 (PRIOR ART)

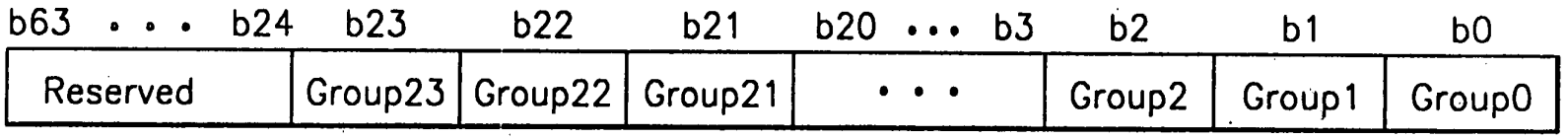


FIG. 2

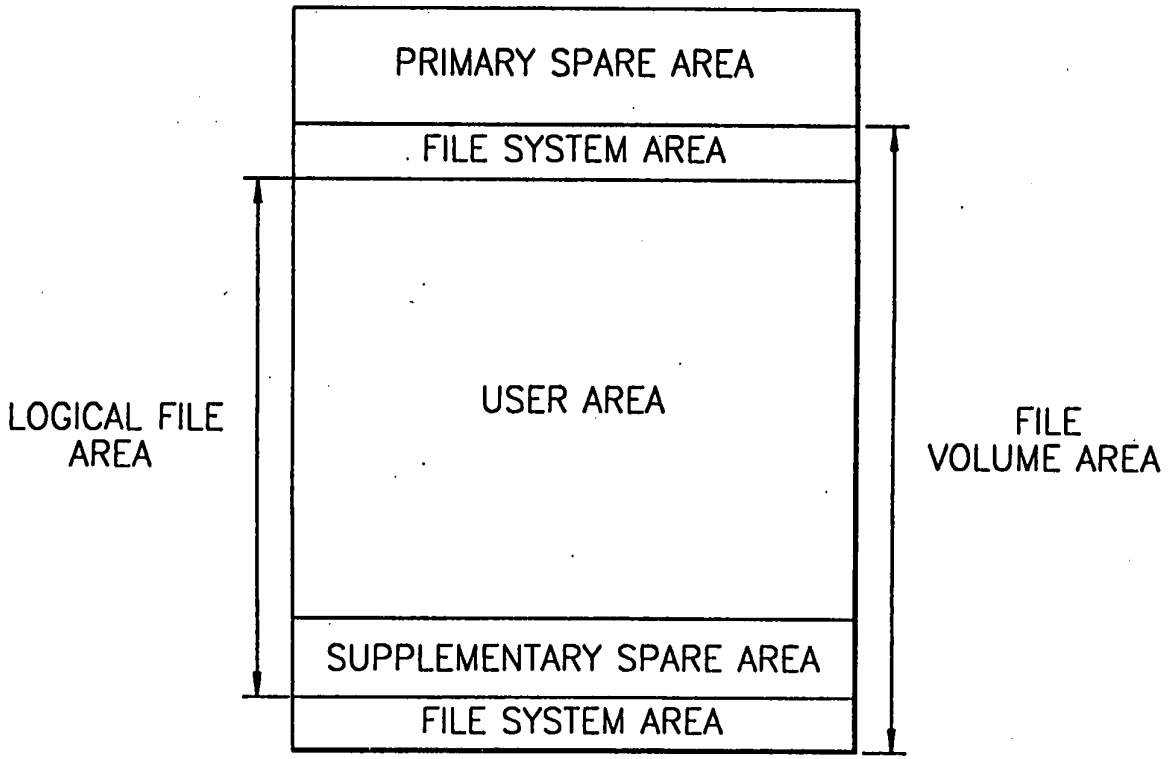


FIG. 3A

FIG. 3B

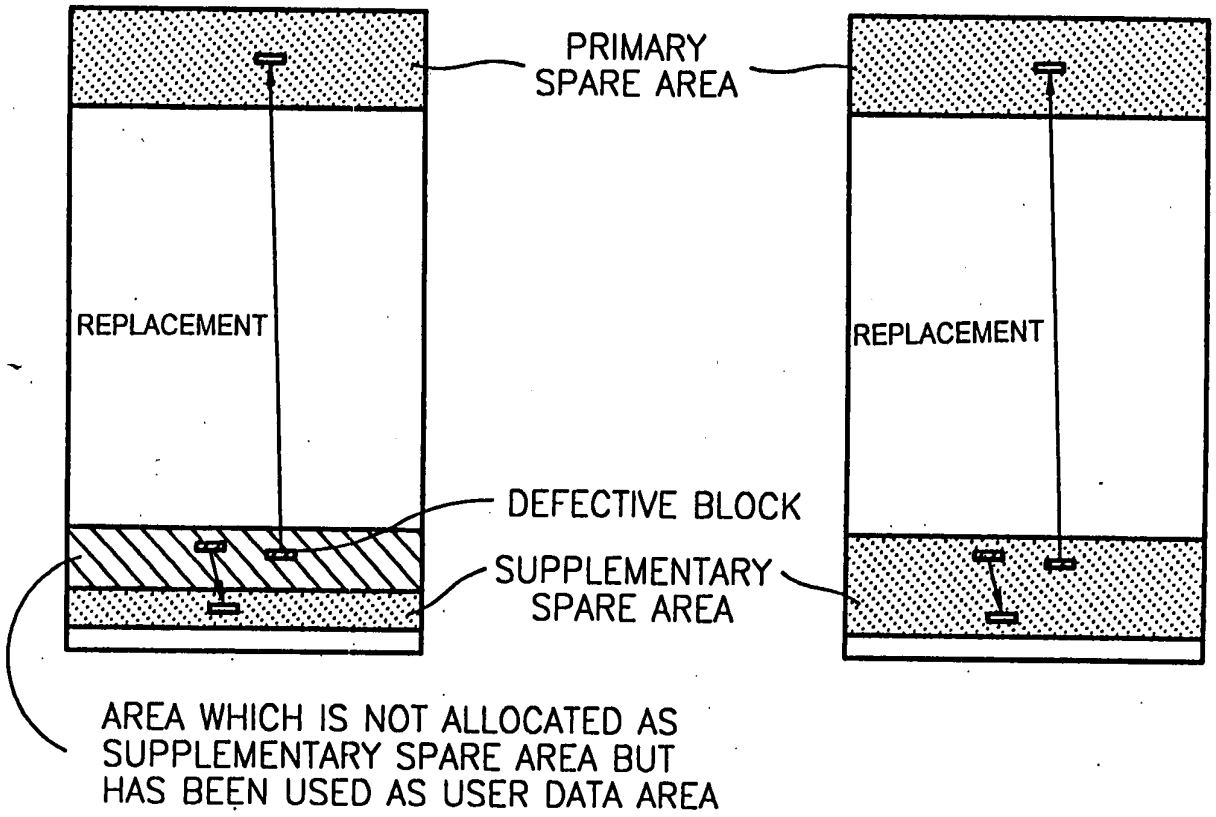

PRIMARY
SPARE AREA
REPLACEMENT
DEFECTIVE BLOCK
SUPPLEMENTARY
SPARE AREA
AREA WHICH IS NOT ALLOCATED AS
SUPPLEMENTARY SPARE AREA BUT
HAS BEEN USED AS USER DATA AREA
REPLACEMENT

FIG. 4A

32K BUFFER MEMORY MODEL

Number of PDL Entries	Max. no. of SDL Entries	Min. Alloc.	Min. Required Spare area(32K)			Total no. of defects	Recommended spare area			
			Blocks	MB	%		+32BLK		+48BLK	
0 – 511	3837	320	3901	127.8	2.7	4348	4096	2.8	4096	2.8
512 – 1023	3581	352	3677	120.5	2.5	4604	3872	2.7	3888	2.7
1024 – 1535	3325	384	3453	113.1	2.4	4860	3648	2.5	3680	2.5
1536 – 2047	3069	416	3229	105.8	2.2	5116	3424	2.4	3472	2.4
2048 – 2559	2813	448	3005	98.5	2.1	5372	3200	2.2	3264	2.3
2560 – 3071	2557	480	2781	91.1	1.9	5628	2976	2.1	3056	2.1
3072 – 3583	2301	512	2557	83.8	1.8	5884	2752	1.9	2848	2.0
3584 – 4095	2045	544	2333	76.4	1.6	6140	2528	1.7	2640	1.8
4096 – 4607	1789	576	2109	69.1	1.5	6396	2304	1.6	2432	1.7
4608 – 5119	1533	608	1885	61.8	1.3	6652	2080	1.4	2224	1.5
5120 – 5631	1277	640	1661	54.4	1.1	6908	1856	1.3	2016	1.4
5632 – 6143	1021	672	1437	47.1	1.0	7164	1632	1.1	1808	1.3
6144 – 6655	765	704	1213	39.7	0.8	7420	1408	1.0	1600	1.1
6656 – 7167	509	736	989	32.4	0.7	7676	1184	0.8	1392	1.0
7168 – 7679	253	768	765	25.1	0.5	7932	960	0.7	1184	0.8

FIG. 4B

64K BUFFER MEMORY MODEL

Number of PDL Entries	Max. no. of SDL Entries	Min. Alloc.	Min. Required Spare area(64K)			Total no. of defects	Recommended spare area			
			Blocks	MB	%		+32BLK		+48BLK	
0 – 511	3837	320	3901	127.8	2.7	4348	4096	2.8	4096	2.8
512 – 1023	3837	352	3933	128.9	2.7	4860	4128	2.9	3888	2.9
1024 – 1535	3837	384	3965	129.9	2.7	5372	4160	2.9	3680	2.9
1536 – 2047	3837	416	3997	131.0	2.8	5884	4192	2.9	3472	2.9
2048 – 2559	3837	448	4029	132.0	2.8	6396	4224	2.9	3264	3.0
2560 – 3071	3837	480	4061	133.1	2.8	6908	4256	2.9	3056	3.0
3072 – 3583	3837	512	4093	134.1	2.8	7420	4288	3.0	2848	3.0
3584 – 4095	3837	544	4125	135.2	2.9	7932	4320	3.0	2640	3.1
4096 – 4607	3837	576	4157	136.2	2.9	8444	4352	3.0	2432	3.1
4608 – 5119	3837	608	4189	137.3	2.9	8956	4384	3.0	2224	3.1
5120 – 5631	3837	640	4221	138.3	2.9	9468	4416	3.1	2016	3.2
5632 – 6143	3837	672	4253	139.4	2.9	9980	4448	3.1	1808	3.2
6144 – 6655	3837	704	4285	140.4	3.0	10492	4480	3.1	1600	3.2
6656 – 7167	3837	736	4317	141.5	3.0	11004	4512	3.1	1392	3.3
7168 – 7679	3837	768	4349	142.5	3.0	11516	4544	3.1	1184	3.3

FIG. 5A

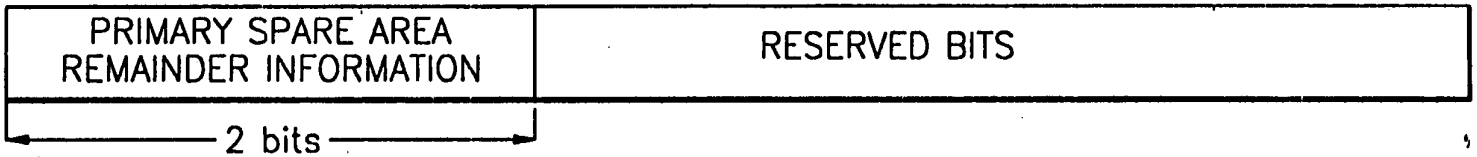

PRIMARY SPARE AREA REMAINDER INFORMATION
RESERVED BITS
2 bits

FIG. 5B

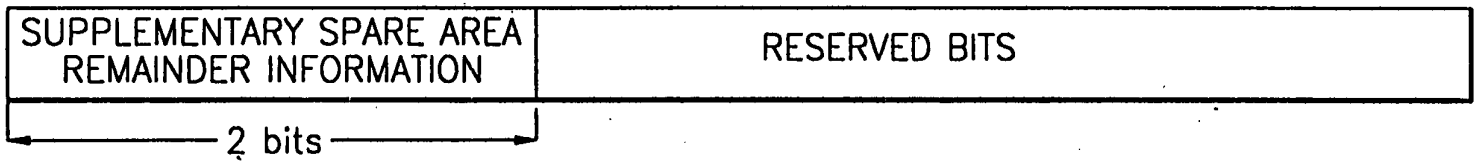

SUPPLEMENTARY SPARE AREA REMAINDER INFORMATION
RESERVED BITS
2 bits

FIG. 6

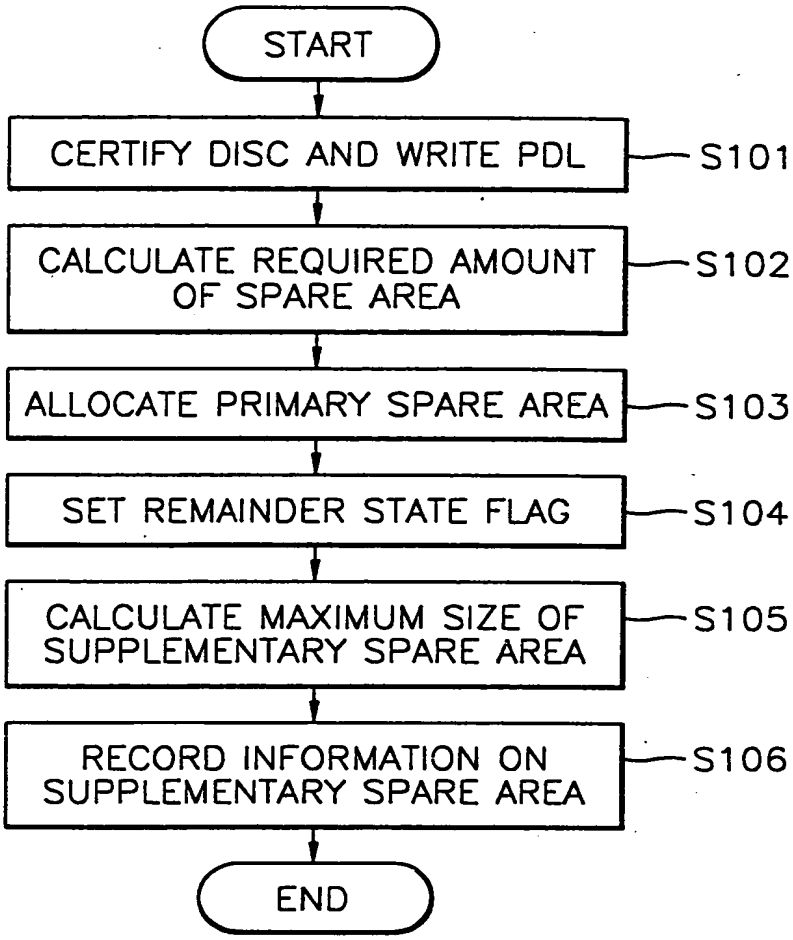

START
CERTIFY DISC AND WRITE PDL
S101
CALCULATE REQUIRED AMOUNT OF SPARE AREA
S102
ALLOCATE PRIMARY SPARE AREA
S103
SET REMAINDER STATE FLAG
S104
CALCULATE MAXIMUM SIZE OF SUPPLEMENTARY SPARE AREA
S105
RECORD INFORMATION ON SUPPLEMENTARY SPARE AREA
S106
END

FIG. 7

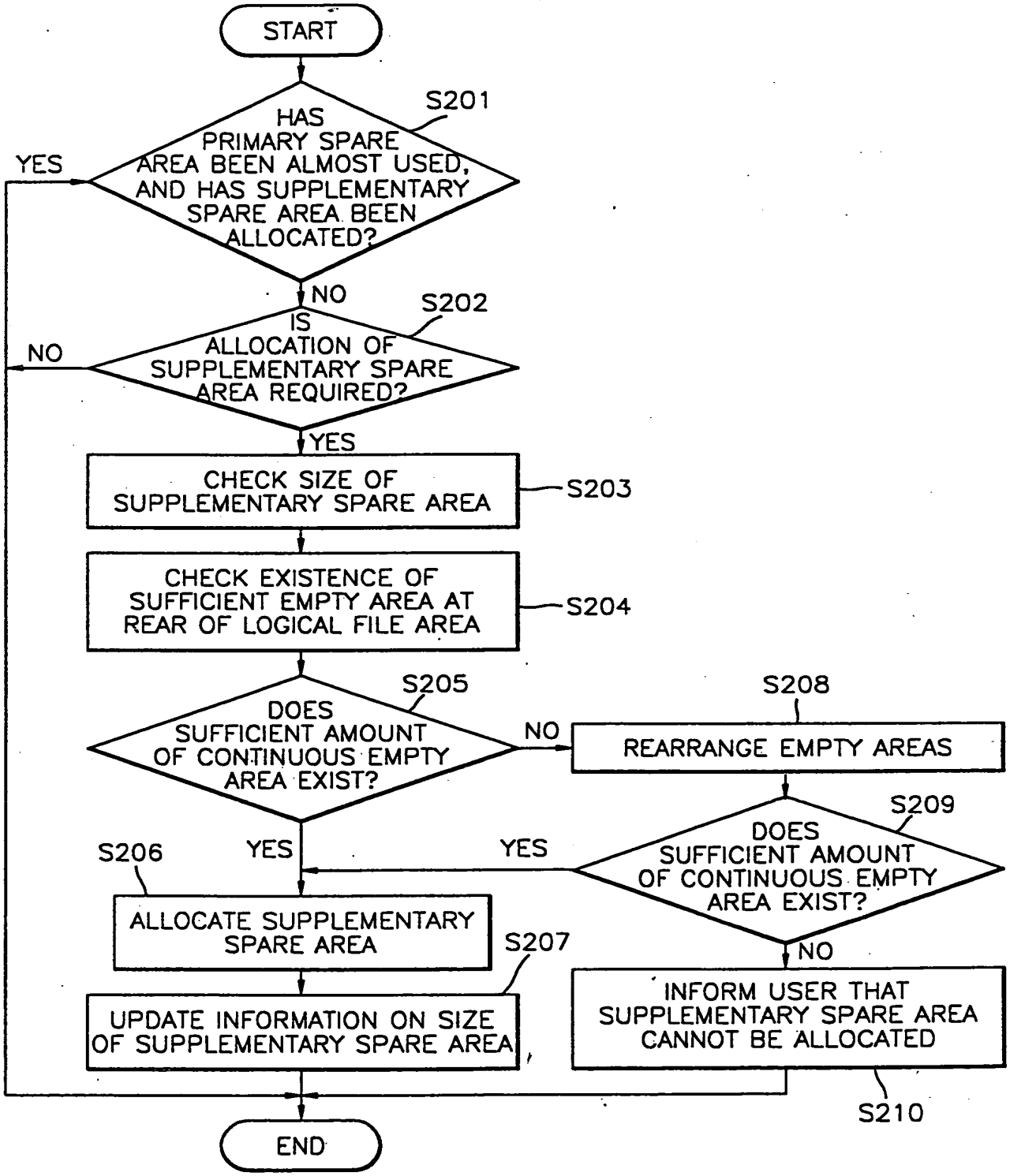
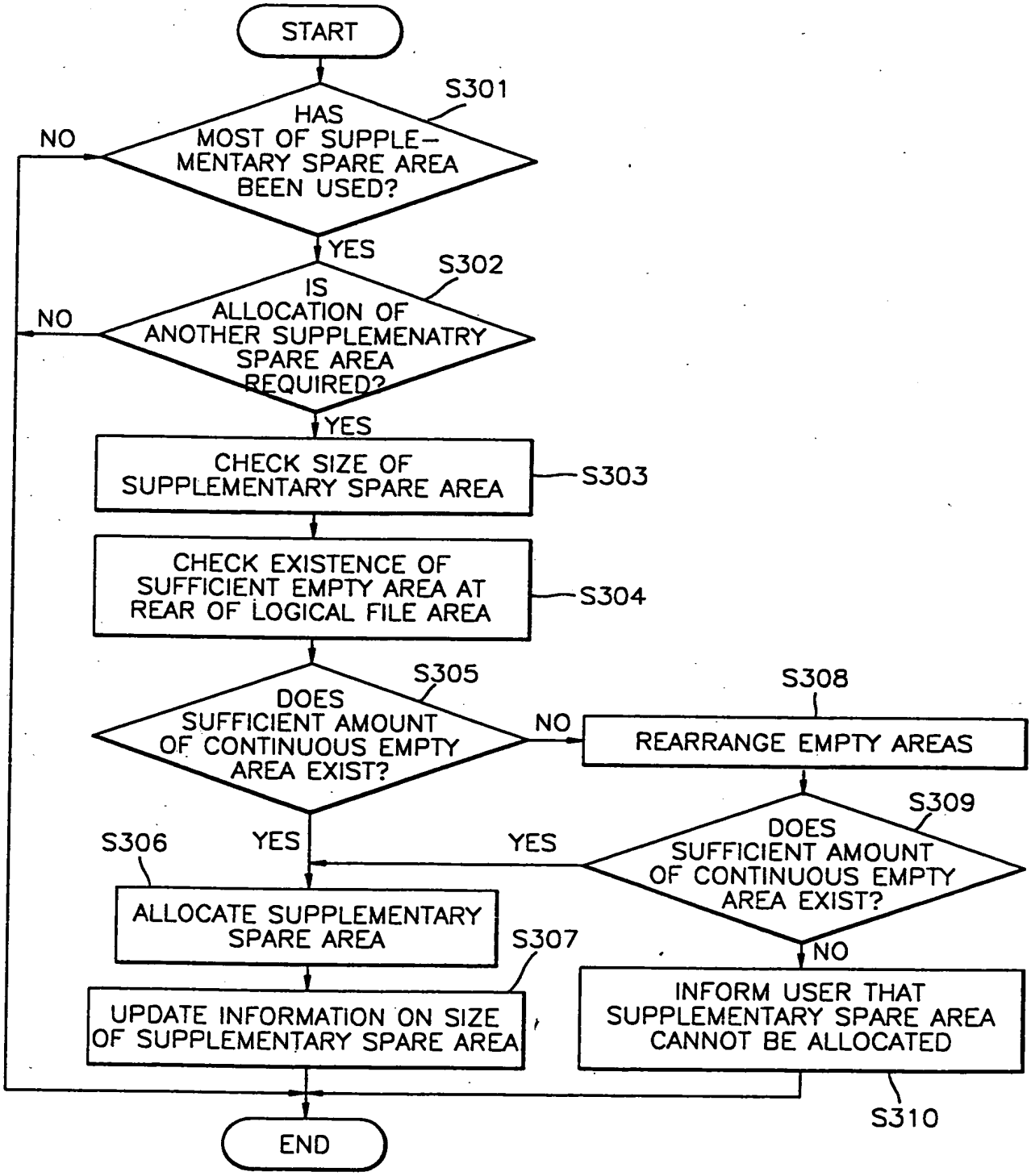

START
S201
HAS PRIMARY SPARE AREA BEEN ALMOST USED, AND HAS SUPPLEMENTARY SPARE AREA BEEN ALLOCATED?
YES
NO
S202
IS ALLOCATION OF SUPPLEMENTARY SPARE AREA REQUIRED?
NO
YES
CHECK SIZE OF SUPPLEMENTARY SPARE AREA
S203
CHECK EXISTENCE OF SUFFICIENT EMPTY AREA AT REAR OF LOGICAL FILE AREA
S204
S205
DOES SUFFICIENT AMOUNT OF CONTINUOUS EMPTY AREA EXIST?
NO
S208
REARRANGE EMPTY AREAS
S209
DOES SUFFICIENT AMOUNT OF CONTINUOUS EMPTY AREA EXIST?
YES
YES
S206
ALLOCATE SUPPLEMENTARY SPARE AREA
S207
UPDATE INFORMATION ON SIZE OF SUPPLEMENTARY SPARE AREA
NO
INFORM USER THAT SUPPLEMENTARY SPARE AREA CANNOT BE ALLOCATED
S210
END

FIG. 8


START
S301
HAS MOST OF SUPPLE-MENTARY SPARE AREA BEEN USED?
NO
YES
S302
IS ALLOCATION OF ANOTHER SUPPLEMENATRY SPARE AREA REQUIRED?
NO
YES
CHECK SIZE OF SUPPLEMENTARY SPARE AREA
S303
CHECK EXISTENCE OF SUFFICIENT EMPTY AREA AT REAR OF LOGICAL FILE AREA
S304
S305
DOES SUFFICIENT AMOUNT OF CONTINUOUS EMPTY AREA EXIST?
NO
S308
REARRANGE EMPTY AREAS
S309
DOES SUFFICIENT AMOUNT OF CONTINUOUS EMPTY AREA EXIST?
YES
YES
S306
ALLOCATE SUPPLEMENTARY SPARE AREA
S307
UPDATE INFORMATION ON SIZE OF SUPPLEMENTARY SPARE AREA
NO
INFORM USER THAT SUPPLEMENTARY SPARE AREA CANNOT BE ALLOCATED
S310
END